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ABSTRACT

The purpose of this handbook is to describe selected management tools useful to elementary and secondary school administrators. It attempts to provide the administrator with knowledge that will stimulate the use of these tools in an educational environment. It is intended to enable the administrator to direct educational programs to a productive and successful conclusion. Chapter 1 of the handbook describes the background and history of management tools. Chapters 2, 3, and 4 present three basic types of management tools: the Planning, Evaluation, and Review Technique (PERT); zero-base budgeting; and Gantt, milestone, and flow charts. Chapter 5 discusses application considerations.
(Author/JM)

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# *Educational Management Tools*

# *for the*

# *Practicing School Administrator*

A Handbook for School Administrators
Who Wish to Plan, Organize, Allocate Resources,
and Control Educational Programs

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# *Foreword*

During the past decade there has been an increasing emphasis upon obtaining the greatest efficiency and effectiveness for resources allocated to educational institutions. In addition, the various publics served by educational institutions have demanded increased accountability and more information about the achievements of the school system.

The growth and expansion of the 1950s and 1960s is over for most of the elementary and secondary schools of this nation. School districts are now in a reduction and retrenchment period. Current and projected declines in enrollment and resources are requiring school administrators to obtain the greatest returns possible from the available resources and to manage these resources with the highest possible expertise.

AASA, in its continued quest to provide leadership in school administration, requested Sam W. Bliss to produce this handbook to guide the practicing school administrator in managing the affairs of educational institutions. Dr. Bliss has had many years experience in educational management. His contributions to the field have been through research and development activities, organizational and personnel development programs, and publications.

It is our wish at AASA that this handbook will provide a means through which practicing school administrators can accomplish the planning and operational control of educational programs. Thus, educational administrators facing the challenges of the future can become more successful in meeting the need for improved utilization of the resources society provides to educational organizations.

Paul B. Salmon
Executive Director
AASA

# *Introduction*

This handbook is directed to practicing administrators and those who aspire to be administrators of educational institutions. Although the contents are oriented primarily to administrators of elementary and secondary schools, the concepts and methodology are applicable to all levels of educational management.

The purpose of this handbook is to describe the logic and methodology of selected management tools. In addition, it should provide the administrator with the necessary knowledge of concepts and procedures to stimulate the use of these tools in an educational management environment. Such use will enable the administrator to improve educational management by directing and guiding educational programs to a productive and successful conclusion.

The handbook does not discuss all aspects or all types of management tools. The management tools presented are those relevant primarily to the present educational situation and to the practicing school administrator.

Basically, the user of a management tool seeks to maximize the attainment of goal/objective achievement for educational programs or projects through better planning and decision-making about the utilization of allocated resources. There is no easy or quick solution to the efficient and effective management of educational resources. The use of available management tools, however, enables the administrator to minimize the risks and reduce the margin of error in guiding a program through its operational phases.

In this handbook the term *administration* will be used interchangeably with *management*, as will the terms *administrator* and *manager*. This interchange is appropriate when educational personnel are engaged in the management of programs or projects. Management may be viewed as a more encompassing activity than administration, in that it involves further planning and decision-making intended to change the future course of events. In using management tools, management therefore

extends the parameter of the situation to achieve a higher level of efficiency and effectiveness.

The contents of this handbook will be presented in five chapters. Chapter one briefly describes the background and history of management tools. Chapters two, three, and four present three basic types of management tools. The fifth and final chapter discusses application considerations.

There is no intent in this writing that these management tools change the direction, content, and/or philosophy of educational theory or practice. These tools are a means for practicing school administrators to manage the processes more expediently. Their ultimate goal is to improve educational opportunities for the students.

Sam W. Bliss
Northern Arizona University
Flagstaff, Arizona

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# Chapter 1

# The Development of Management Tools

Current management tools came into being during the period immediately following World War II, and their development has continued for approximately three decades with the recent introduction of zero-base budgeting. The study of educational administration as a separate discipline has existed for more than seventy years.

During the early 1900s both commerce and education went through a period of what Frederick Taylor called "scientific management." From the 1920s to 1930s, the scientific management of business and industry influenced educational administration. Following the great depression which lead education to become disenchanted with scientific management, an era of humanistic management developed during the 1930s and 1940s. A return to the scientific basis for educational administration occurred during the 1950s, with theory and theory models serving as the major emphasis. Advocates of administrative theory, however, had difficulty convincing the practitioners to use their models in managing educational operations because of the problems in translating theory into practice.

Operations research and general systems theory evolved after World War II. Operations research focuses on the system by creating a mathematical description of the real situation through an analysis of the existing structure and its relationships. The resulting mathematical model of the organization is then used to try out new or difficult configurations of circumstances that may impact upon the institution. Planners can obtain information about potential plans of action prior to their use in the organization. Thus, the best or most desirable plan can be initiated into practice.

General systems theory, as used by practitioners, allowed them to develop a simplified conceptualization of their operations. In education the system is defined as having inputs, processes, and outputs. Inputs are what enter the system; the processes are the operations that change inputs into outputs. William H. Curtis has developed a schematic diagram to portray his version of an educational system (see Figure 1) using the general systems theory approach.

Along with operations research and systems theory during the 1960s and 1970s came a parallel desire to manage the identified and defined operations more effectively and efficiently. A number of management techniques and/or tools were developed by government, business and industry, and education to manage the new research and development projects.

The Elementary and Secondary Education Act of 1965 and other federal and state government programs created an additional need for education to utilize the management tools spawned by operations research and systems theory. During the late 1960s and the 1970s, educational institutions moved into the era of accountability. The management tools of operations research and systems theory are useful mechanisms for responding to the accountability demands of education's various publics.

The use of management tools in education for planning, operating, and controlling programs or projects meets the need of educational managers who want predictable and relevant outcomes. The relationship between input, process, and output is placed in perspective by using the appropriate management tool. The tools described in this handbook provide the practicing school administrator with a systematic, organized means of acquiring and communicating information essential to achieve a high level of educational output.

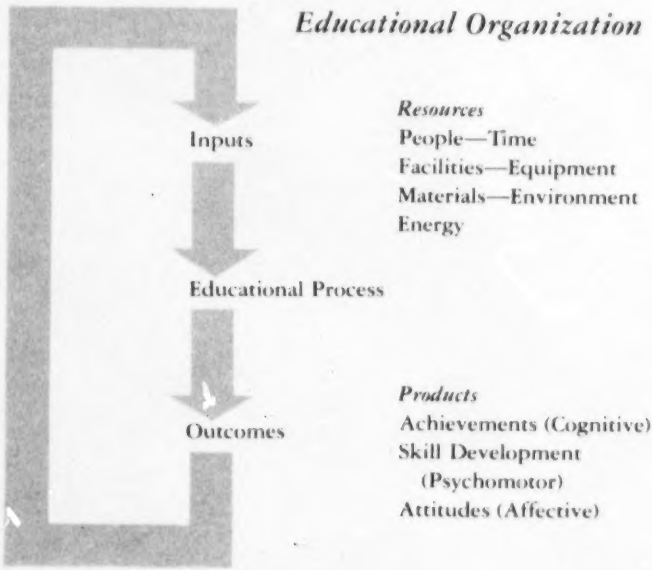
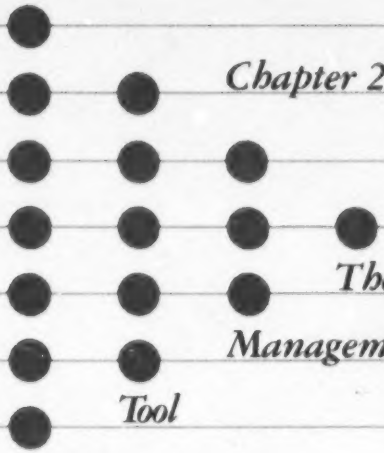



*Figure 1. The Educational System*



# Chapter 2

# The PERT Management Tool

## Understanding PERT

PERT is an acronym which means Planning, Evaluation, and Review Technique. PERT, as a management tool, provides a methodology for planning, scheduling, and controlling resources required to achieve program objectives. First developed by the United States Navy for planning and scheduling the production of the Polaris ballistic missile in the late 1950s, PERT provides for systematic analysis of programs where there is an element of uncertainty about the exact time needed to complete program tasks.

Thus PERT is a management tool for:

1. Defining and integrating tasks that must be accomplished to achieve program objectives on time.
2. Planning which addresses the uncertainties faced in completing the program activities essential for timely achievement of program schedules.
3. Focusing management's attention on problem areas that require remedial and replanning decisions.
4. Providing program information needed by decision-makers, but not for making their decisions.
5. Communicating program plans and schedules to other persons involved in the organization's operations.

PERT has three significant advantages for the decision-makers. First, it is an excellent tool for organizing and structuring thinking about the tasks that must be accomplished to achieve a program's objectives. Second, PERT provides a well-organized methodology for the analysis and decision-making of multiphased programs. Third, PERT method of presentation aids in the communication of program plans to all levels of management and staff.

Fundamental to understanding PERT is the concept of network design. A *network* is a flow chart representing a program plan that shows the sequence and interrelationships of events and activities in relation to a time schedule. An *event* is a meaningful specified accomplishment, either physical or intellectual, that does not consume time or resources. An event in a network is usually represented by a circle called a "node." An *activity* is a time- and resource-consuming task of a program. It is the effort that must be accomplished between events. An activity in a network is represented by an arrow (——→).

## Usefulness of PERT in Educational Management

PERT is useful in managing many types of educational endeavors for the following reasons. In general, educational institutions operate in a time-constrained environment: i.e., state law prescribes the length of the school year; students attend school a certain number of hours each day; programs and/or projects have scheduled completion dates. Also, educational programs and projects have established objectives that must be achieved, usually within a definite time period. These programs and projects consume resources over time and have a set of definable tasks or activities.

Programs for which PERT is useful in an educational environment include the following:

- Introduction of a curriculum innovation
- Preparation of the annual budget
- Tax and bond referendums
- Community attitude surveys
- Educational needs surveys
- School building construction
- School building renovation
- Preparation of new curriculum guides
- School building maintenance
- Management of federal and state special projects, such as Title I, Title VII, Career Education, Special Education, etc.
- Implementing a new or improved management system
- Installing a computer system
- Planning and installing a management information system
- Preparing and implementing a personnel evaluation system
- Organizing and conducting inservice training programs

The above list represents only a small number of program areas where PERT could be used to plan, schedule, and control resources to maximize the achievement of objectives.

## Using PERT: The Steps

To use PERT requires that a program be defined as one that:

1. Has an organizational goal(s) or objective(s).
2. Must be completed within a specific time frame.
3. Has been allocated resources.
4. Must achieve a desired performance within the time frame and allocated resources.

Therefore, programs subject to PERT are finite in that they have a definite beginning and termination point in time. The program must be homogeneous; that is, it must be capable of being isolated and set apart from other programs. The program should be complex in that it contains a mixture of human and material resources that are related to a series of required activities. Each activity in the program must have a definite beginning and end and can thus be started or stopped independently. Finally, the activities of the program must be such that they can be arranged in a sequential order which, if followed, will lead to the successful attainment of the program objectives.

As noted previously, a large number of programs in an educational organization can be subjected to PERT management. Four basic steps are involved in using PERT to plan, schedule, and control programs:

1. Identify, define, and list the meaningful activities of the program.
2. Construct a network by arranging the list of activities in a logical sequence to represent their interrelationships visually.
3. Establish the time needed to complete each activity.
4. Calculate the time required to complete the entire program and the times for completion of each individual activity so that the program will be finished on schedule.

These four basic steps will be discussed in order so as to provide an understanding of the complete PERT methodology.

## Step 1. Activity Identification

The first step for using PERT is to identify the meaningful activities of the program. Thus, the program must be divided into its various component activities. As an example, assume that you wish to use PERT to arrange for a consultant to make a presentation about zero-base budgeting to your board of education. The definition of the required activities may be accomplished by you alone or you may wish to involve others. In either case, a list of meaningful activities involved in the zero-base budgeting presentation must be made. Since the program is new, perhaps the first activity would be to develop the objective(s) for the presentation. The next activity might be a review of the potential consultants, which will lead to the selection of the

desired consultant. The consultant will prepare the presentation as the third activity. A fourth activity could be arranging the presentation date with the board of education. The fifth activity could be scheduling the space and essential equipment. You may wish to review the consultant's agenda and presentation as a sixth activity. The seventh activity could be the consultant's presentation to the board. The following list presents these seven meaningful activities in outline form.

1. Establish the objective(s)
2. Select consultant
3. Consultant prepares presentation
4. Set date for the presentation
5. Arrange for space and equipment
6. Review consultant presentation
7. Presentation to the board

Note that this program for a zero-base budgeting presentation meets the requirements of PERT. It has a definite time to begin and end, and each activity is discrete in that it can be started and stopped independently of the others.

The above list of meaningful activities is merely representative of those that could be created. Others may choose to create a smaller or larger list of activities. A list of meaningful activities is defined as those that will assist the planners and decision-makers to attain the desired outcomes of the program.

The important fact to keep in mind is that because PERT is a management tool, its use may vary from any one individual or group of planners. The correct list of activities for any given program is the one that the planners feel to be the most appropriate for their purposes.

It is sometime convenient to use an activity analysis form for listing the activities of programs to be managed through PERT. Usually this type of form provides space for the program objective(s) with at least two levels of activities. The first level activities are major ones which can be subdivided into smaller activities. Although for most programs there usually is no need to describe activities beyond the second level of division, a third activity subdivision could be added by modifying the structure of the form. Figure 2 shows an example of the PERT Activity Analysis Form.

## Step 2. Constructing the PERT Network

The second step in using PERT requires the construction of a network. The network is a visual representation of the activities identified for the program. To construct the network, the identified activities must be arranged in order of completion by determining which activities must be finished before any subsequent activity can begin. In the zero-base budgeting presentation, for example, the activity for establishing the objectives for the board of education should precede the selection of a

Title of Program _____

Page 1 of _____

Date _____

Prepared By _____

| *Program Objectives* | *First Level Activities* | *Second Level Activities* |
|---|---|---|
| | | 1a |
| | 1. | 1b |
| | | 1c |
| | | 1d |
| | | 2a |
| _____ | 2. | 2b |
| | | 2c |
| | | 2d |
| | | 3a |
| | 3. | 3b |
| | | 3c |
| | | 3d |
| | | 4a |
| | 4. | 4b |
| | | 4c |
| | | 4d |

*Figure 2. Example of a PERT Activity Analysis Form*

consultant to make the presentation. Also, the consultant's preparation of the presentation will precede the manager's review.

An activity sequence form can be used to assist PERT network developers to arrange activities in their appropriate order. A draft network may be developed and redone over and over again until the sequence of activities satisfies the developers. Figure 3 illustrates an Activity Sequence Worktable Form. The activity titles or numbers are written in the squares according to their defined sequence. The Activity Sequence Worktable Form can be used to construct the network when agreement is reached about the arrangement of the activities. Large Activity Sequence Worktable Forms may be prepared to accommodate large PERT networks.

In many programs where PERT is useful, there are usually many more activities than the few listed in the example. In addition, some activities may be accomplished at the same time as others through the use of additional resources. Resources are defined as personnel, time, equipment, supplies and materials.

Various types of network construction are available for developing a complete network.

***Linear Construction***

A linear construction is useful when one activity follows another and there are no parallel activities. The solid arrow depicts an activity between two events. The event

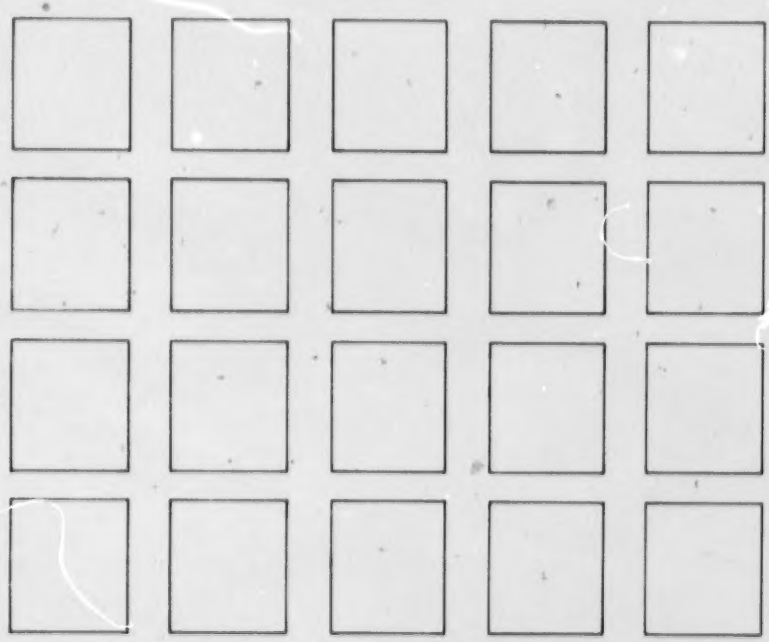


*Figure 3. Activity Sequence Worktable Form Example*

numbers at the beginning of an activity and at its end are used to identify each activity. In Figure 4 below there are two activities and three events. The events are numbered 1, 2, and 3. The first activity is numbered 1-2 and the second is numbered 2-3.

*Figure 4. Linear Network Construction*

***Parallel Construction***

A parallel construction is necessitated when two or more concurrent activities are impacting upon certain events. In Figure 5, any activity planned to follow event 4 cannot begin until activities 2-4 and 3-4 are complete. Also, illustrated are two styles of arrows for representing activities. A connector symbol is used to link networks from one page to following pages (see Figure 5).

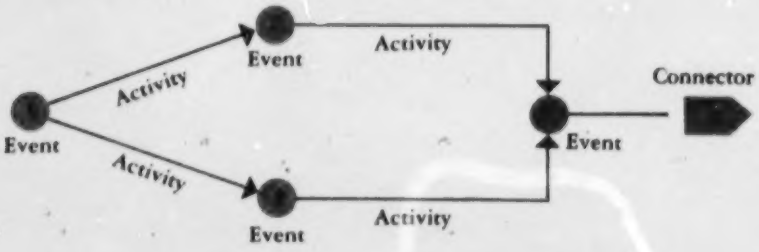



*Figure 5. Parallel Network Construction*

***Burst Construction***

Sometimes it is necessary to have two or more activities coming out of a single event. Figure 6 is an example of this type of network construction.

*Figure 6. Burst Network Construction*

***Converging Construction***

A converging type of network construction illustrates the situation when two or more activities are to merge into a single event. Figure 7 shows a converging network.

*Figure 7. Converging Network Construction*

***Dummy Activity***

Dummy activity lines are used to specify and clarify dependency among network relationships. They are used when no time or resources are consumed between events. The dummy activity may be used to provide for single starting or ending of programs that have multiple starts or finishes. Dummy activities are depicted by broken line arrows, as shown in Figure 8.

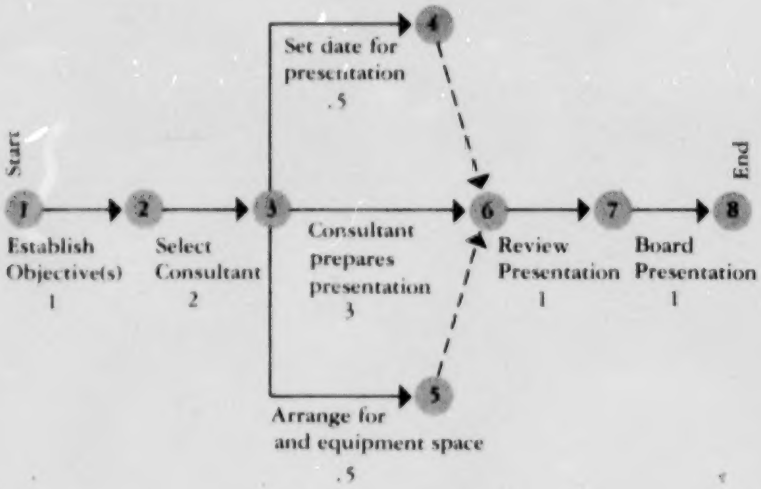
*Figure 8. Dummy Activity Network Construction*

There are two important additional rules for constructing networks:

1. Every event is unique and can occur only once in a network.
2. There can be no loops; that is, no network events can be designed to return to a previously accomplished event.

A network for the zero-base budgeting board presentation can be constructed after the activities have been placed in sequence. Usually, the construction of a network requires one or more drafts before the network reaches its final stage. The actual construction begins with arranging the events and activities on paper or on forms designed to space them appropriately. The events are then connected with activity lines called arrows. After placing events and activity lines, the events are numbered. In large networks numbering may be from right to left or left to right, whatever seems most appropriate. Remember that no two events of activities can have the same number.

A network for the zero-base budgeting presentation is illustrated in Figure 9. This network shows linear, parallel, burst and converging construction patterns. The dummy activity serves to clarify and unify the network. A number of options are available to the network developer for identifying each event and activity. Events and activities must all have unique identification characters.




| Activities | | |
|---|---|---|
| Event No. | Description | Predecessor |
| 1-2 | Establish objective | |
| 2-3 | Select consultant | 1-2 |
| 3-4 | Set date for presentation | 2-3 |
| 3-5 | Arrange for space and equipment | 2-3 |
| 3-6 | Consultant prepares presentation | 2-3 |
| 4-6 and 5-6 | Dummy activities | 3-4 and 3-5 |
| 6-7 | Review presentation | 3-6 |
| 7-8 | Board presentation | 6-7 |

*Figure 9. Example of Network for Zero-base Budgeting Presentation*

## Step 3. Establishing the Time for Activities

After the activities have been defined and ordered sequentially from start to finish in the network, it is essential to establish the time each activity listed in the network will take to complete. The next major time consideration is to identify the maximum

estimated time for completion of the program. The path through the network that requires the maximum time is called the critical path (CP).

The critical path is identified by

- Determining the time required to complete each activity in the network,
- Placing the time on each activity arrow,
- Computing activity completion time for all paths through the network, and
- Identifying the path with the longest completion time. (This path is the critical path.)

Figure 10 shows the correct location of the time value assigned to each activity.

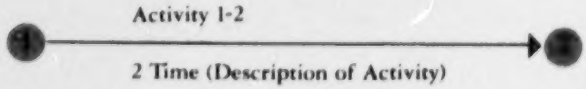



*Figure 10. Activity Time Placement*

In all PERT network construction, it is necessary to establish a standard measure of time that will be used for all activity time estimates. Time estimates may be standardized to hours, days, weeks or months depending upon the nature of the program. In making time estimates for activities in a network, it is assumed that:

1. Resources will be available on a normal basis or as needed by the program.
2. A 5-day 40-hour work week will be the usual operational situation.
3. Schedule or calendar dates have no effect on time estimates.

If two or more persons are estimating time, one way to secure time estimates for activities would be to have each person independently estimate a time for completing the activity, then add all individual time estimates and calculate an average. The average time becomes the activity time estimate.

Another way, perhaps a little more accurate than the above, is to use a Beta distribution (a basic statistical assumption) method. This method requires that three time estimates be developed for each activity:

1. *Optimistic time (O)*—the least amount of time the activity will require under the most optimum conditions
2. *Most likely time (M)*—the time that the activity will take under normal conditions
3. *Pessimistic time (P)*—the time estimate that the activity will take under the most unsatisfactory conditions.

After these three time estimates are obtained for the activity, they are inserted into the following Beta distribution formula.

$$t_e = \frac{O + 4(M) + P}{6}$$

Activity time estimates are given the symbol $t_e$. Note that the most likely time is

given a weight of 4. An example of the calculation of an activity is as follows:

| | Activity 1-2 | |
|---|---|---|
| (O) | Optimistic time | = 3 days |
| (M) | Most likely time | = 5 days |
| (P) | Pessimistic time | = 10 days |

$$t_e = \frac{3 + 4\,(5) + 10}{6} \qquad t_e = 5.5 \text{ days}$$

The $t_e$ is usually rounded off to the nearest tenth of a day.

The accuracy of time estimates will depend upon how well the activity is defined and the judgment of persons making the estimates. Often the time estimates for activities are well known from the past experiences of people involved in this process.

Once all activities have been assigned a time estimate, the next procedure is to calculate the completion time for the program. The completion time is computed by conducting two "passes" through the network, the first "pass" going from left to right and the second "pass" from right to left.

***Earliest Start—Earliest Finish***

In the left to right or forward "pass," the earliest start time and the earliest finish time are calculated for each activity. The earliest start time is based on the fact that the initial time of the program is always zero.

The earliest finish time is the earliest start time *plus* the time duration of each activity, as shown in the formula below:

Earliest finish time = Earliest start time + Time duration of the activity

These two time quantities are usually placed above the activity line as follows:

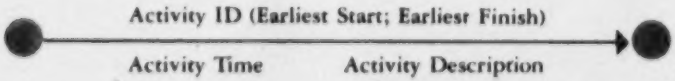



*Figure 11. Example of Location for Earliest Start and Earliest Finish Time*

The calculation for the earliest start time and earliest finish time is illustrated in the partial network for the zero-base budgeting presentation shown in Figure 12.

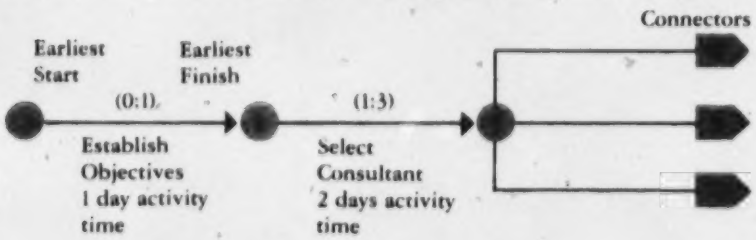



*Figure 12. Example of Earliest Start and Earliest Finish Times*

It is assumed that the earliest start is zero (S = O) for activity 1-2. The earliest finish is 0 plus 1 or 1 for activity 1-2. For activity 2-3 the earliest start is 1 and the earliest finish is 3. This earliest start and earliest finish time calculation is continued for all activities in the network in a left to right direction.

***Latest Start—Latest Finish***

The next time calculations, for the latest start and latest finish times for each activity in the network, are calculated by completing a right to left "pass" through the entire network.

Figure 13 presents the location and calculation essential for obtaining latest start and latest finish times.

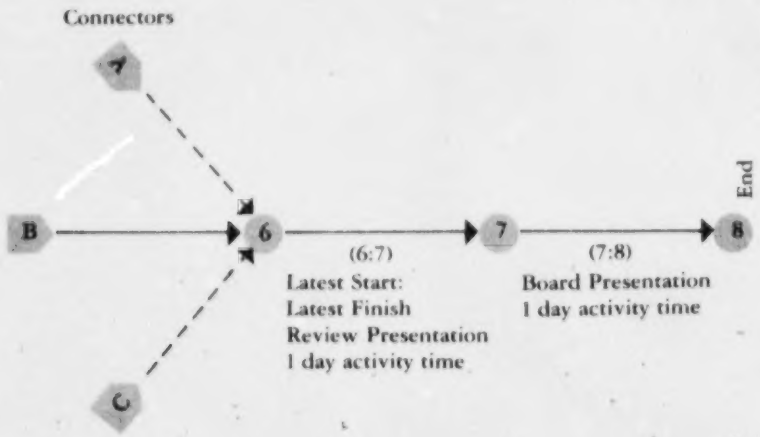



*Figure 13. Example of Latest Start and Finish Times*

The latest start of an activity is the latest finish minus the time duration of the activity. Activity 7-8 has a latest finish of 8 days. Eight days minus 1 day equal the latest start of 7 days for activity 7-8.

The latest finish is always the minimum of the latest start time for the immediate successor activity or activities. For activity 6-7 the latest finish is 7 days which is the latest start of activity 7-8.

***Total Slack***

During the right to left or backward "pass," one additional time calculation is made to determine total slack for each activity in the network. Total slack (TS) for an activity is the amount of time which all activities up to and including that activity can be postponed without delaying the finish of the program. Total slack for any given activity is the difference between the latest start and the earliest start of the activity. Another way to determine total slack is the difference between the earliest finish and

latest finish of the activity. The example below will demonstrate the calculation of total slack.

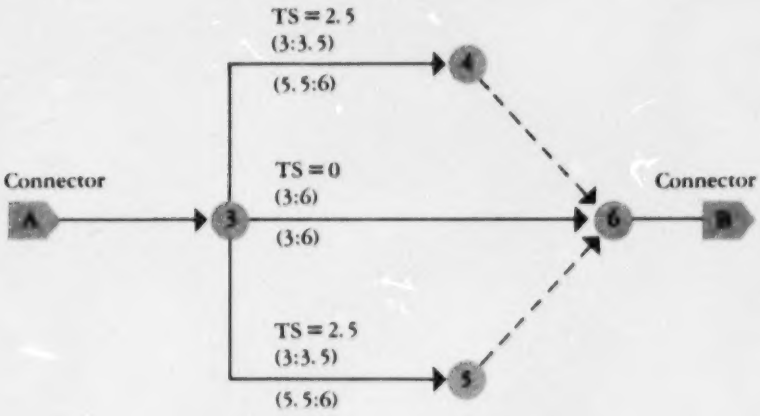



*Figure 14. Example of Total Slack Calculation*

Total slack (TS) for activity 3-4 is 2.5; for activity 3-6 it is 0; and for activity 3-5 total slack is 2.5. Thus both activities 3-4 and 3-5 could be delayed 2.5 days without causing a delay in the finish time of the program.

***The Critical Path***

Once the total slack is calculated for all activities in the network it is possible to determine the critical path for the program. As previously defined, the critical path is the particular sequence of activities in the PERT network which determines the maximum amount of time needed to finish the program. Critical path is the one path from the beginning to the ending event which has the least amount of positive or the greatest amount of negative slack. This path is designated as the critical path (CP) because each activity must be completed within the assigned time period in order to finish the entire program in the desired length of time. Any time overrun for an activity on the critical path will delay the completion of the program unless management can shorten time accordingly for the remaining activities.

To determine the critical path of a network, it is necessary to identify the series of connected activities which have a total slack of zero (TS = 0). The critical path is usually designated by a double activity line. The critical path and other network time quantities are displayed in Figure 15. In Figure 15 the activities on the critical path are 1-2, 2-3, 3-6, 6-7 and 7-8. All of these activities have a TS of zero.

In some management situations, administrators of educational programs may not wish to develop a PERT network in its most classic form, as previously discussed. A modified PERT network which omits the determination of individual activity times and the critical path may be developed. This type of modified network employs

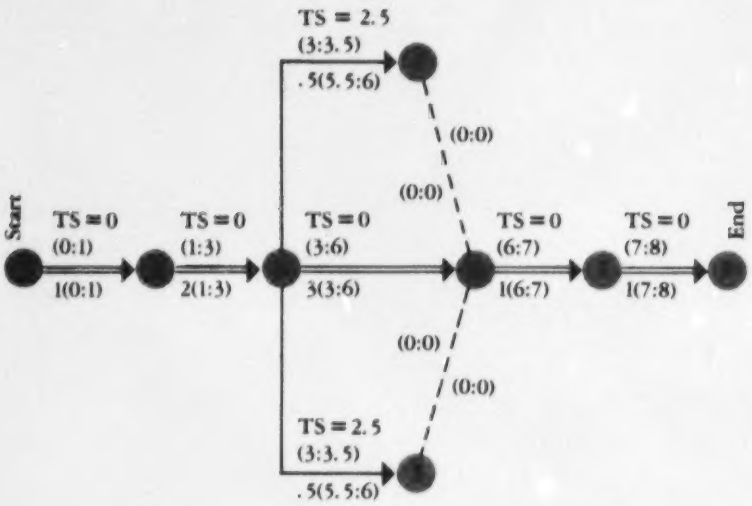


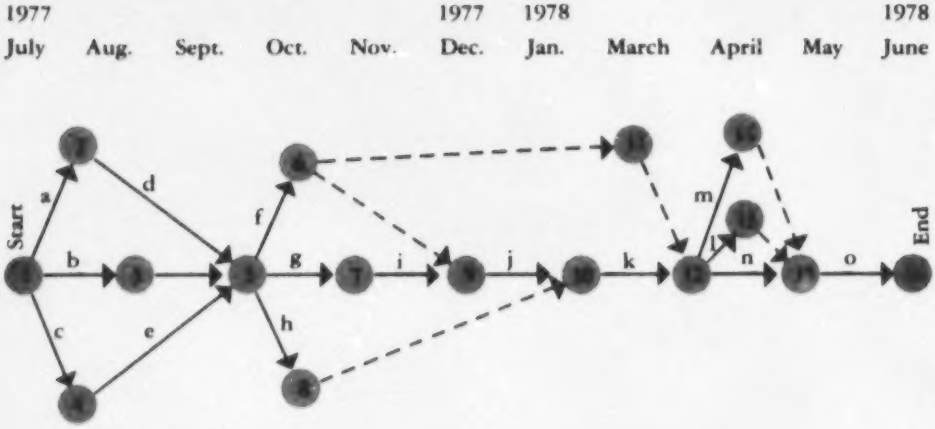

*Figure 15. Zero-Base Budgeting Board Presentation—8 Days Time Duration*

a monthly timeline which spans the fiscal year of the program. This modified PERT network does not have the precision of a fully developed network but its arrangement of activities by a monthly time dimension is useful for management planning and control. It is easier and faster to develop because the activities are not subjected to detailed time calculations. An example of a modified PERT network is presented in Figure 16. The modified network does not provide management with the detailed information of a full and complete PERT network. Thus, management may not have as much control over the program activities as if a complete PERT network had been developed.

## Management Schedules and Replanning Networks

In the zero-base budgeting presentation example, no fixed time was specified for the completion of the program. However, this flexibility is usually not the situation for most educational programs. Often management, because of special considerations, will require a program to be completed by a specified date.

Usually the development of a PERT network is the developer's best calculation of activities and time required to complete the program. If a management-scheduled completion date is earlier than the planned completion date for the program, there exists a negative slack for the program. This problem requires the network to be replanned. Perhaps more resources can be assigned to the activities to finish the program within management's scheduled date of completion. Another alternative is




| ID | Activity Description |
|---|---|
| a. | Assign Staff Responsibilities |
| b. | Review and Allocate Finances |
| c. | Develop Yearly Calendar of Activities, Events, and Meetings |
| d. | Print Staff Training Handbook |
| e. | Start Scheduled Reporting and Dissemination Procedures |
| f. | Develop Course Content with Instructors |
| g. | Continue Articulation of Program Content |
| h. | Record Course Content in District Credit Program |
| i. | Report Course Completion Developed |
| j. | Complete Dissemination Form and Content |
| k. | Dissemination of Materials, News, etc. |
| l. | Final Review of District's Training Program |
| m. | Final Review of Individual Outcomes |
| n. | Final Monitoring/Evaluating Activity |
| o. | Final Report |

*Figure 16. A Modified Network Showing a Monthly Timeline for Activities in a District's Staff Training Program*

to start the program earlier in order to finish the program on or before the finish date established by management or some outside authority. In other instances, when completion date exceeds the planned network time, the start of the program can be delayed.

Replanning of PERT networks is necessitated when certain activities use more

time than originally estimated. When this occurs, management can apply certain procedures to correct these problems. Management can

1. *Remove planned constraints*—Planned constraints can be those activity/event relationships that are most desirable but not absolutely necessary. Scheduled completion dates can also be altered by management.
2. *Use parallel activities*—Sequential or linear activities can be conducted in parallel if resources are available to conduct the additional parallel activities.
3. *Eliminate activities*—The program may contain some activities that can be eliminated without seriously hampering the total effectiveness of the program.
4. *Reallocate resources*—Additional resources may be assigned to the critical path activities to maintain their desired time for completion. Management will need to determine whether the time saved is worth the cost.
5. *Redefine activities*—The original network activities may represent gross accounts of work. A redefining and closer analysis of these types of activities may reveal that they can be rescheduled to save time in the network.

It is important to remember that the use of PERT allows management to plan and replan a program and to solve problems before it is too late to remedy them.

## Management Planning to Meet a Scheduled Date

If in the time estimations of each activity the developers used the three time estimates (optimistic, most likely, and pessimistic), it is possible to forecast the probability (chance) of completing the program on the scheduled completion date. The probability technique of PERT distinguishes it from other types of management tools. The use of the probability theory allows management to use PERT as a predictive tool for forecasting the probability of meeting the scheduled dates of activities. The use of probability theory is based upon the assumption of the central limit theorem of statistical theory, which states that the distribution of the earliest expected time of completion is approximately a normal curve. The normal curve distribution has the characteristic that the area under the normal curve represents all of the probability occurrence of values within the area. A normal curve distribution of values is always symmetrical, with the highest value on the $y$ axis called the mean ($\bar{X}$).

As mentioned earlier, the time required for an activity is an estimate; that is, the activity completion time is uncertain. Thus, the activity completion time may take on any value within a given range. In statistical language such an uncertain value is called a random variable. Its value in a specific instance cannot be predicted with absolute certainty, but its average, or expected value can be estimated on the basis of an assumption about the properties of its probability distribution and the three points of this distribution (optimistic, most likely, and pessimistic time values). Recall that in the network the average, or expected, project length was calculated by adding all of the $t_e$'s along the critical path. All of the $t_e$'s are random variables (estimates), thus the expected completion time for the entire network is a single random variable.

However, from a statistical viewpoint the expected completion time does not have the same distribution of all $t_e$'s. The total expected completion time approximates the normal curve distribution. Because of this fact, much management information can be inferred about the program length if the expected length and standard deviation of its distribution is known. In the normal curve, a ± 1 standard deviation from the mean of a normal curve includes about 68 percent of its distribution. Because the area under a normal curve corresponds directly with probability measures, it can be assumed that:

1. A random variable drawn from a normal distribution has a 68 percent probability of being within ± 1 standard deviation of the mean.
2. A random variable within ± 2 standard deviations has a 95 percent probability of including the random variable.
3. A ± 3 standard deviations has a 99.7 percent probability of encompassing the random variable.

These probabilities assume that the project length is normally distributed and the estimated activities are random estimates. By using the characteristics of the normal curve and accepting the above assumptions, one may obtain information to answer the question, What is the probability that the program will be completed by the established completion date?

For example, suppose the completion date is 24 days from the beginning. Management usually will wish to know how likely the program is to be finished by the end of so many days. To answer this question requires determining the standard deviation of the completion time from the activity time estimates (the $t_e$'s). The steps to answer this management question are illustrated by the example of a simple network (Figure 17).

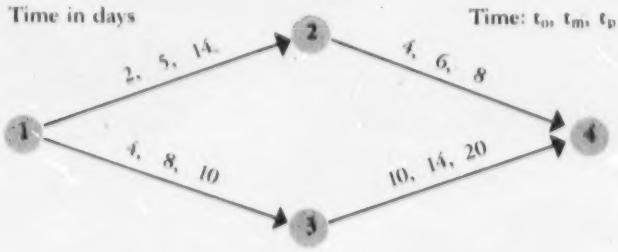



*Figure 17. Example Network*

| Activity | Expected Time | Standard Deviation | Variance |
|---|---|---|---|
| 1-2 | 6 | 2 | 4 |
| 1-3 | 8 | 1 | 1 |
| 2-4 | 6 | 1 (.66 round to 1) | 1 |
| 3-4 | 16 | 2 (1.66 rounded to 2) | 4 |

The expected time is calculated as previously explained by using the following formula:

$$t_e = \frac{0 + 4\,(M) + P}{6}$$

The standard deviation for each activity is computed by using the formula below:

$$SD = \frac{t_p - t_o}{6}$$

SD = standard deviation

Variance for each activity is found as follows:

$$V = \left(\frac{t_p - t_o}{6}\right) 2 \text{ (squared)}$$

V = variance

The variance can be calculated more simply by squaring the standard deviation of each activity.

Next the variance of the critical path (longest path through the network) is computed. The critical path is along activities 1-3, and 3-4 and has a total time length of 24. The variance of the critical path is then calculated by adding the variances of activities 1-3 and 3-4.

$$V_T = 1 + 2 = 3$$

The standard deviation is the square root of 3 or 1.73, which may be rounded to 2 days.

Utilizing the normal curve, it can be assumed that the program has 68 percent probability of being completed within one standard deviation of the expected time of 24 days. Somewhere between 22 and 26 days. Also, the program has 95 percent probability of being completed between 20 and 28 days (two standard deviations from 24 days).

These values are displayed below:

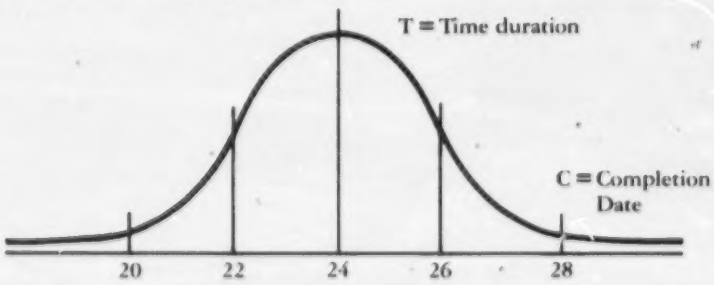



*Figure 18. Distribution of Program Times*

If management has established a scheduled completion date of 28 days, it is now possible to determine how likely the program is to be completed in 28 days. Again,

the standard normal probability tables enable the question to be answered. One need only to determine the number of standard deviations of the completion date from the expected time duration.

The following formula is used:

$$Z = \frac{CD - T_e}{S_T}$$

Z: number of standard deviations

CD: Completion date in days

$T_e$: expected time estimate

$S_T$: standard deviation (1.73 rounded to 2)

$$Z = \frac{28 - 24}{2} = 2$$

Using a standard table for Z (found in most books on statistics), a Z or standard deviation of 2 yields a standard table probability value of 97.7 percent. This means that the program has a 97.7 percent probability of being completed by the due date. This 97.7 percent is a high probability value. Management may set an acceptable probability value of 75 percent or 80 percent as being high enough before any replanning of the network is necessary. Low probability values indicate to management that replanning is essential.

## PERT Resource Cost Determination

In the development of activities for a PERT network, the resources allocated to each activity can in turn be assigned dollar costs. The major advantages of adding cost information to a PERT network are that it provides for:

1. A more realistic program cost estimate.
2. Comparison of estimated costs with actual costs.
3. The optimum allocation of resources to the program.
4. Forecasting the total program costs.

Resource allocation and their associated dollar costs should begin with the development of the network activities. In large networks the major activities, rather than the individual activities, may be assigned a cost amount because of the time and effort required to estimate the cost of each separate activity.

## PERT and the Computer

Many programs in education are relatively simple and thus can utilize PERT through manual procedures. However, some large programs or projects are quite complex, in that they involve extended time periods and many resources. These programs often encompass many activities which have complex interrelationships. Actually, PERT

has its greatest utility in these large, complex programs, but they are very difficult to develop using manual procedures. The computer can assist in developing and managing programs of this type. PERT has been adapted to the computer by many software manufacturers and users. Computer programs, along with the guidelines for their application, are available to persons wishing to develop PERT networks for large, complex programs. These computer programs also allow the PERT user to input periodically actual progress information, which is then compared to the PERT network plan. Output from this comparison is provided in several types of management reports which can be analyzed for replanning purposes.

## PERT Summary

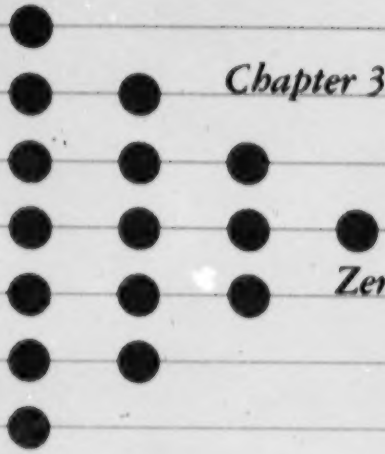
PERT as a management tool provides management with a means for planning, scheduling, and controlling programs. It is:

1. A planning and scheduling method.
2. A visual presentation of a management plan using a network.
3. A procedure which allows for trade-offs among time, costs (resources), and performance.

To use PERT the planners follow a series of well-defined steps:

1. Define and list program activities
2. Determine preceding activity-events
3. Continue to search the list, asking of each item:
   a. What must precede
   b. What can be accomplished concurrently
4. Develop a network of the activities and events
5. Estimate time required for each activity
6. Review and determine that all consecutive steps are necessarily consecutive
7. Determine total slack
8. Define and chart the critical path
9. Determine the total time required
10. Prepare a time summary and make assignments
11. Evaluate periodically and post actual time used to complete each activity
12. Replan PERT where necessary

The practicing school administrator will realize several management benefits through the use of PERT. One such benefit is that PERT provides an organized discipline for analyzing the objectives, activities, resource costs, and performance results of a program. Another major benefit is that PERT assures that a program will begin and end as scheduled. PERT also assists persons involved in a program to understand their areas of responsibility. The use of PERT and the visual presentation in a network improves communication among and between various levels of operations.



# Chapter 3

# Zero-Base Budgeting

At the present time there is considerable interest in zero-base budgeting among school administrators. This interest is attributable to the search for improved management tools to meet the planning and control aspects of educational institutions. Added stimulus results from the fact that zero-base budgeting is being implemented in the federal government. On February 14, 1977, President Jimmy Carter issued an executive memorandum to the Heads of Executive Departments requesting them to implement zero-base budgeting in their divisions.

These and other reasons have lead to zero-base budgeting in some local school districts. Whether or not the present interest will lead to widespread use of zero-base budgeting in local educational agencies remains a question that only time can answer. Although zero-base budgeting encompasses processes and concepts that are potentially useful for most school districts, the realization of its benefits depends heavily upon satisfactory human relationships and adequate communication, as well as on its methods or techniques.

As of the date of this handbook, the implementation of zero-base budgeting has occurred almost entirely in business and industry and government. Will zero-base budgeting become a useful management tool for educational agencies? Will zero-base budgeting replace other current educational accounting systems? Does zero-base budgeting offer school administrators a better approach to the planning and control process so vital in managing educational organizations? Is it an effective way to control school costs so as to receive the greatest return on limited resources?

The above questions and others can be answered only by the administrators of the nation's schools. Because of the organization and structure of zero-base budgeting, school administrators cannot ignore its potential. In their key leadership role of planning and controlling resource utilization in school districts, administrators should, at the minimum, develop a sound understanding of zero-base budgeting.

## Background

Zero-base budgeting was originally developed and introduced into business by Peter A. Pyhrr during 1969 when Pyhrr was the manager of staff control at Texas Instruments, Inc., in Dallas. Zero-base budgeting was subsequently introduced into other businesses, state governments and the federal government. The first state government to implement zero-base budgeting was Georgia in 1973 under Governor Jimmy Carter. Senator Edward Muskie sponsored the Government Economy and Spending Reform Act of 1976 (S. 2925) in Congress, which required a congressional zero-base review and evaluation of all governmental authorizations for programs every five years. The Act also required the Director of the Office of Management and Budget to develop a program for zero-base budgeting in all departments and agencies of the executive branch.

In education, perhaps the first school district to implement the concepts of zero-base budgeting was the Greece Central School District in Greece, New York. In 1975-76 the Greece Central School District began the implementation of zero-base budgeting under the acronym "SCAT," the School Cost Analysis Team.

Other school districts are now exploring the use of zero-base budgeting. The Memphis Public Schools are two years into the installation of zero-base budgeting. At this writing, widespread use of zero-base budgeting as a management tool has not occurred in educational organizations. In view of the increasing use of zero-base budgeting by industry, public utilities and governmental agencies, however, it seems reasonable to expect its greater use by educational agencies.

## Zero-Base Budgeting Characteristics

Pyhrr has defined zero-base budgeting as a management tool that companies can use to improve planning, budgeting, and operational decision-making. Its primary concept is that all managers will replan their programs from the ground up and provide justification for all resources requested to achieve the goals of the organization. This concept implies that many changes may occur in the program and in the allocation of resources to the desired programs from one budget period to the next.

The zero-base budgeting method is applicable to all programs of an organization. A program is subject to zero-base budgeting when there exists a resource/cost effective relationship. Cost effectiveness is an analysis of the stated program objectives in terms of the resource costs required to attain them. The resource cost of a program and its alternatives are usually translated into dollars. The program's measures of effectiveness are stated in quantitative and/or qualitative terms. Cost effectiveness analysis is accomplished by dividing the effectiveness measures of the program by its dollar costs. The resulting index indicates the ratio of program costs to program effectiveness. When cost effectiveness indexes are obtained for each program alternative, decision-makers are able to identify the program alternative that offers the desired effectiveness for the least cost.

Cost effectiveness analysis is a process which provides administrators with information essential for analyzing programs and their alternatives. Also, the findings of cost effectiveness analysis (the cost index or ratio of cost to effectiveness) may be used to help rank programs in a priority order with all other programs in the organizational divisions of the institution.

In education zero-base budgeting can be applied to administrative, instructional and support functions at all levels, including state and federally funded projects. Consequently, zero-base budgeting assists program planning and cost effectiveness analysis between programs to achieve the most desirable relationship between attaining objectives and utilizing the district's resources.

In a business organization when a program cannot be justified in terms of its objectives and costs, it is usually terminated. In education, however, the ending of programs is not always possible because of local policy, state or federal law. For these types of programs, zero-base budgeting helps the planners obtain a greater degree of objective achievement with the most reasonable use of resources.

Zero-base budgeting implies that all programs will be assessed and their costs justified each year. Some educational programs may be analyzed yearly; others may be subjected to review over longer periods of time. New programs may be analyzed every year for several years. Other programs that are required year after year can be assessed less frequently. Educational programs with objectives that cannot be achieved in a single year should be reviewed for the same time period specified by the objectives. Zero-base budgeting does require that all existing programs be periodically monitored and evaluated as to their contributions to the district's goals, just as any new or proposed program would be.

Zero-base budgeting is accomplished through the following steps:

1. Determination of the organization's *decision units*. A decision unit is any program division that consumes resources. A decision unit is also identified as a budget unit. A decision unit is described in one or more documents called decision packages. The most finite document prepared for planning and analysis in zero-base budgeting is the decision package. Generally, each decision package will contain, at the minimum, objectives, activities, resources and costs.
2. Management analysis of the decision packages. This process allows the manager of the decision package to replan and justify its operation. Several questions are asked and answered during the analytical process.
   - Does the decision package support and contribute to the goals/objectives of the district?
   - What would be the result to the institution if the decision package were eliminated?
   - Can the decision package objectives be achieved more effectvely and/or efficiently?
3. Ranking of decision packages. A ranking procedure is used to establish a rank order of priority for decision packages within a divisional level. Ranking is a method of evaluating all decision packages in relationship to each other. Since

there can be any number of ways to rank decision packages, organizations will employ various methods. The main issue is that the ranking process is an important facet of zero-base budgeting.

4. Approval and allocation of funds. After a review and analysis of all decision packages, administrators will approve and determine the amount of funding for each decision package. In a school district this process will probably be done by the superintendent and the executive cabinet, with final review and approval by the board of education.
5. Budget document preparation. Following step four, the official district budget document is prepared. This final step leads to board of education approval of the budget and other actions as required by state school law.

## Decision Package

The zero-base budgeting process has two basic operations: (1) the development of decision packages and (2) the ranking of decision packages. The decision package provides a written description of a program so that management can (1) analyze and rank it with other programs that utilize organization resources, (2) make a decision about acceptance or nonacceptance of the program, and (3) decide upon the funding level of accepted programs for inclusion in the budget. The information presented in a decision package should enable management to clearly identify and associate the relationship of the program to the goals and objectives of the organization. A decision package can thus be defined as a document that provides information about a separate function, program, or activity of the organization which consumes resources and is subject to management planning and decisions.

Zero-base budgeting, as a management tool, assists program administrators to analyze their operations. It also provides information to upper level administrators to allocate resources more effectively. The following procedures accomplish this analysis and decision-making:

1. Identification of the district's decision units.
2. Creation of decision packages for the decision units.
3. Analysis of all decision packages.
4. Assessment and ranking of the decision packages.
5. Approval and allocation of the organization's resources for each decision package.

## Identifying the Decision Units

Zero-base budgeting allows administrators of programs to focus their attention on evaluating the program and to make decisions about its continuation. Program divisions that consume resources can be designated as decision units. A decision unit

is usually any budget or cost unit in the organization. In some districts where there are many different functions, the administrator may wish to develop several decision units, which are then analyzed individually. A decision unit can also be identified as individual projects, specific job assignments, or capital projects. Each individual district will determine for itself the kind and type of decision unit it will want to analyze and make decisions about when using zero-base budgeting.

In education, decision units for administration may be the superintendent's office, the personnel division, the business office, the research department, elementary and secondary instruction, etc. Some of these decision units may be too large for meaningful decision-making and analysis and thus could be separated into smaller units. For example, secondary instruction may be divided into several decision units, such as curriculum services, school building attendance centers, special projects, etc. Usually upper level administration will identify the broad divisions or program levels as major decision units. It then becomes the responsibility of the lower level administrators to determine additional decision units, if appropriate, within the broad categories identified. After administration has identified the decision unit, the next step in zero-base budgeting is to develop one or more decision packages for each decision unit.

## Developing the Decision Package

When installing zero-base budgeting, administrators must make decisions about where and how many decision packages to develop. The creation of too many or too few decision packages will make their analysis unmanageable and restrict the benefits of zero-base budgeting.

The size of the district and its method of operation are key factors in determining where and how many decision packages to develop. Perhaps an appropriate way to begin would be to use the district's organizational chart. The line and staff organizational chart of school districts may indicate where to develop decision packages. If, for example, the budget center activities are too large for meaningful analysis, the administrator can divide the function into several separate decision packages or a single series of related decision packages.

Personnel workloads and time commitment are other factors that should be considered when developing decision packages. The first year of implementation will require more time and effort than the following years because zero-base budgeting is new. Training programs, decision package development, ranking of decision packages and other implementation activities consume more time during the first year of implementation. Careful planning of time and workload is essential during the first year of implementation. If the installation of zero-base budgeting is allowed to become too burdensome, personnel may get discouraged, fall behind schedule, and eventually may refuse to participate because it hinders their performance of other responsibilities.

In educational institutions, which are basically service-oriented, decision package development may be concentrated on the following subjects:

- Personnel and staff
- Instructional and support service programs
- Special projects
- Program budget divisions
- Objects of expenditure
- Capital outlay programs

Each district will establish its own guidelines for the creation of decision packages. Development guidelines should be incorporated into the master plan or manual for implementing zero-base budgeting in the organization. The zero-base budgeting implementation manual will be discussed later.

## Decision Package Structure and Format

The basic purpose of the decision package is to present information about the program to administrators who have responsibility for analysis and decision making. This information is also used by higher level administrators who review, rank, and approve resources for program operation. The decision package communicates the recommendations of lower level administrators to higher level administrators regarding program implementation.

Decision packages can become too lengthy (too much information) or too brief (not enough information) for adequate analysis. Also, too many decision packages may possibly be developed if the administrators document all finite levels of effort. Too much information (too many decision packages) can defeat the benefits of zero-base budgeting. It is not practical to describe the precise amount of information a decision package should contain; this is a local school district's decision. Some basic suggestions, however, might be useful in identifying the information to include. The information should:

1. Assist administrators to analyze each program and to make a decision about whether or not to allocate resources and to set the level of funding.
2. Provide cost/effectiveness data, which is useful in making funding-level decisions.
3. Display quantitative data required for special analytic procedures.
4. Include coding and classification information that will enable administrators to group resources and costs by the district's budget categories.
5. Provide any other information useful to the administrator who prepared the decision package for discussion purposes in special sessions with administrators from different levels of management.

## The Content of Decision Packages

Information contained in a decision package should be determined by persons implementing the program. The agreed upon form and content should be included in the zero-base budgeting implementation manual for use by personnel in the district. A pilot test of the decision package in a limited area may lead to an improved format preceding its use throughout the entire district. Also, format changes in the decision package may be made at appropriate times after years of use.

First,the decision package should include a basic description of the package, including:

1. The title
2. Date of development
3. Rank identification number
4. District level description
5. Budget and accounting codes
6. Name of person(s) who developed the package

The title identifies the function or program that is the basic subject of the document. It may signify that the package represents a separate and distinct program or that it is one of a series of packages representing a large budget or cost center. The date helps to identify the most current package prepared. Rank information indicates the order of priority the package has with the other packages within a specific organizational level. The name of the person(s) who developed the pa.kages usually fixes the responsibility for program management. The operational level locates the package in the district. The budget and accounting codes enable the administration to place the package in its appropriate position in the budget and accounting system. This general descriptive information is given at the top of the decision package form.

A second major content area deals with the purpose of the program. The purpose section should explain how the program relates to the goals of the district; goals and objectives may be included here. Additional description of purpose might include an explanation of the service(s) to be provided, the specific need to be met, and/or the problem the program is seeking to solve.

A third area of information describes the methodology. In this section the specific methods and activities required for the program implementation are described, including the specific kinds and types of resources needed. Resources usually include time, personnel, materials and supplies, equipment and facilities, as well as any special arrangements related to them. The dollar cost of the resources may either be part of this section or detailed in a following section.

If cost information is not included with the program methodology, it should be provided in a separate descriptive section. Cost information is valuable for ranking each decision package with all other packages. In most if not all educational institutions, resources are limited; consequently, each decision package competes with all others for these resources. To be of maximum use in the analytic process,

program costs should be related to expected program effectiveness. Information about cost effectiveness is very helpful to administrators who are ranking decision packages.

Cost data in the decision packages must be standardized by some acceptable method(s). If no method is established, costs may vary in any number of ways. For example, costs may be expressed in daily, weekly, monthly or annual dollars. Also, costs might be expressed in fulltime equivalents or man-days. Dollar costs may also be expressed by budget expenditure classifications. Under certain conditions, separating costs into research and development and operational classes of expenditures might be desirable.

Cost categories that might be used for a decision package include:

- Personnel salaries
- Employee related benefits
- Travel
- Materials and supplies
- Equipment
- Contractual services
- Operation and maintenance
- Transportation
- Training of personnel
- Communication
- Other

In addition to the above cost categories, it may be advantageous to display program costs for one or more previous years or cost projections for as many as two to four years beyond the current or next year. To further support the analysis of decision packages, variations in cost levels from one year to the next may be shown as percentage increases or decreases. Careful planning is required to establish a suitable method of providing program costs. Once a method of showing costs for decision package activities has been developed, it should be used consistently by all persons throughout the organization. Expected outcomes may be included in the decision package and should be described in both quantitative and qualitative language. In education, qualitative measures of effectiveness are the most difficult since the package developer(s) must often rely on subjective judgments. Quantitative measures of effectiveness are less difficult to describe. The number of students served, hours of instruction provided, types and number of meals served, number of paychecks processed, purchase orders prepared, credit hours or units provided, library books checked out, and buildings painted are but a few examples of quantitative measures of program outcomes. Most educators have become skillful in developing performance objectives which establish both qualitative and quantitative measures of program achievement. The descriptions of outcomes indicate how the program will assist in the attainment of the district's goals and objectives.

Decision package alternatives are an essential aspect of the planning and

decision-making process in zero-base budgeting. A decision package alternative is developed by:

1. Describing different levels of effort and related outcomes.
2. Indicating alternative ways of achieving the program objectives.
3. Listing the consequences resulting from disapproval of funding for the decision packages.

Decision package alternatives require program administrators to identify and describe different ways of operating the program. Each program alternative usually results in a different resource requirement and variations in expected outcomes, which provide additional information for upper level administrators to use in their analysis of alternatives. Decision package alternatives give upper level administrators the opportunity to select the most desirable course(s) of action for the entire organization.

In describing the consequences of limited or no funding, program administrators can evaluate the impact that disapproval will have on the program objectives and the organization as a whole. Thus, the cost savings for not funding the decision package can be evaluated against the program consequences caused by disapproval.

The information displayed in a decision package may include:

1. General descriptive information about the program
2. The purpose of the program including goals and objectives
3. Program activities and procedures
4. Cost data by budget category
5. Expected outcomes (program achievement) and/or effectiveness
6. Consequences of limited or no funding
7. Alternative program efforts
8. Comparative information for prior or future years

There is no standard format for decision packages and perhaps will never be since each organization decides what is most appropriate for its unique operations.

Figure 19 shows an example of a decision package form developed by School District No. 12 in Adams County, Colorado. This form represents an initial design and may be modified in use.

## Decision Package Ranking

Decision package ranking is a procedure for placing all decision packages in a specific order of priority. Several analytic questions are asked by administrators engaged in the ranking process. Three key questions are:

1. What is the worth of this program in relation to the goals of the organization?
2. What is the value of this program in relation to the other programs of the organization?
3. What level of resources should be allocated to what programs?

## *Decision Package*

Date Prepared: _____

Decision Area Name _____ Prepared By _____ Unit _____

Decision Unit _____ Approved By _____ Div. _____

_____ Dist. _____

*Ranking*

| Exist. | Alt. I | Alt. II | Criteria |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Check One: ☐ New Program ☐ Existing Program

Check One: ☐ Curr. & Inst. ☐ Management Services ☐ Auxiliary Services

Function or Purpose of Decision Area: _____

Description of Decision Area: _____

Consequences if Decision Area is eliminated: _____

Measure of Performance _____

*Cost Analysis*

| Expected Outcomes | Support Level | | | Total Cost |
|---|---|---|---|---|
| Existing: | Salaries | Pers. | $ | |
| | Empl. Ben. | | | |
| | Purch. Serv. | | | |
| | Supp. & Mat. | | | |
| | Cap. Outlay | | | $ |
| Alternative I: | Salaries | Pers. | $ | |
| | Empl. Ben. | | | |
| | Purch. Serv. | | | |
| | Supp. & Mat. | | | |
| | Cap. Outlay | | | $ |
| Alternative II: | Salaries | Pers. | $ | |
| | Empl. Ben. | | | |
| | Purch. Serv. | | | |
| | Supp. & Mat. | | | |
| | Cap. Outlay | | | $ |

Note: Use back for additional information or more detailed cost data if above spaces are too limiting. District Objectives Code _____

40

10

*Figure 19. Decision Package for School District No. 12, Adams County, Colorado*

Administration answers these questions when it develops a list of decision packages in order of their value to the organization. The ranking process enables administration to analyze the cost effectiveness of programs, the results of reduced levels of resource allocation, and the consequences of nonapproval of decision packages ranked below a resource commitment level. Ultimately, the ranking process identifies and establishes where administration is willing to expend the district's available resources.

## The Ranking Procedure

Personnel implementing the zero-base budgeting management tool will need to establish the policies, rules, and procedures to be applied in ranking decision packages. Specific ranking forms should be prepared for use in the ranking process and specific ranking policy and procedures considered. These considerations are:

1. What personnel in the organization will do the ranking?
2. At what level of organization will the ranking occur?
3. Will there be special ranking criteria?
4. When and how often will the ranking process be instituted?
5. What kinds of forms will be developed and used to record the ranking decisions?

The policies and procedures of the ranking process, once developed, should be carefully adhered to by all personnel who rank each decision package. If some follow the rules and others do not, ranking can become a useless procedure which will not serve the organization as originally intended.

In a district that encourages participation in planning and decision-making, the first ranking may be done by the person(s) who developed the decision package. This initial ranking allows administrators to evaluate the relative importance of their programs with others at the same organizational level. In addition, the initial ranking serves as a recommendation to upper level administrators which can be used as a basis for consolidating decision packages in large divisions.

The ranking process is usually best accomplished when it is a "bottom to the top" process. The lower level division managers perform the first ranking within their organizational divisions. Following this first level ranking, middle managers and upper level managers review and rank the decision packages. Teams of task groups may be formed to consolidate decision packages at the upper levels of the organization. At this higher level, greater expertise and a broader perspective is required to rank packages. In school districts, however, it may not be necessary to establish new committees; established committees may be assigned summary ranking responsibilities. For example, the superintendent's cabinet and principal's groups can accomplish the ranking process.

The procedure for conducting the ranking process must be established by the district. Several factors should be considered:

1. What packages will be ranked.
2. The number of packages to be ranked.

3. Establishment of voting methods and ranking criteria.
4. The ability and time availability of the people involved in the ranking process.
5. Method of package presentation for ranking.
6. A time schedule for completing the ranking.
7. Procedures for consolidating individual packages in larger groups.
8. Review and final approval for funding level.

A physical sorting by order of importance may be used if number of decision packages is small. In this physical sorting method, each package is analyzed and a priority listing is obtained through the expert judgment of the rankers.

Should the number of packages to be ranked exceed a reasonable number (15-20 packages), other ranking techniques must be developed. A commonly used technique is the voting method. Some possible voting procedures are as follows:

1. The person doing the ranking assigns a single numerical value to the entire package using a predetermined scale of values.
2. Personnel may assign a single numerical value (from a predetermined scale of values) to each selected criteria to be voted on. The total of criteria values then becomes the rank of the package.
3. Members of a ranking committee get one vote on a predetermined fixed scale. The total points or average can then be used to determine the package rank.
4. Each member votes on specifically developed criteria using weighted values. The criteria values are then totaled and averaged.

A single scale voting technique is probably the easiest to use when ranking a large number of packages that require only subjective judgment. A multiple-criteria scale for voting may be used for ranking packages which require detailed analysis.

Resource costs and expected effectiveness also affect the voting judgment of the rankers. The cost information in the decision package(s) provides an indication of total funding level. A decision point representing a program's desired funding level is fixed on the selected numerical scale. It can be used as a decision point for selecting scale values that indicate the priority of funding for the package. Suppose a scale of one to eight has been agreed upon for ranking the package. The concept of the funding decision point is illustrated by the following scale:

| Scale Value | Funding Level |
|---|---|
| 8 | Packages must be funded |
| 7 | |
| 6 | Packages borderline for funding |
| 5 | |
| | FUNDING DECISION POINT |
| 4 | |
| 3 | Packages have some value and would be funded if the expenditure level was increased |
| 2 | |
| 1 | Packages should not be funded |

Voting scales can have any number of values although too wide a range of values is not considered practical. Scales with six to ten values are common in business, industry, and government. Scales with an even number of values tend to work better since they prevent the selection of a middle value for the decision packages.

Decision packages are ranked individually during the process as they are reviewed and analyzed. The package rank results from the voting procedure adopted by the rankers. The initial ranking of packages by the developer(s) of the program may require explanation and discussion with the other persons involved in the ranking process.

Higher level ranking groups who have larger organizational responsibilities will usually review all of the packages to obtain a broad perspective on all the information provided. These higher level ranking groups may not rank all packages but focus only on the lower priority packages near the cut-off funding level. These committees may re-establish the funding limits based upon available resources. Thus, the higher level ranking groups may rank decision packages in the 75 to 110 percent funding area of the present year's expenditure level if they expect a 80 to 100 percent funding level for all packages in the coming year.

Consolidating the packages by major organizational divisions can also assist ranking committees to rank a smaller number of decision packages. Administrators of various divisions may conduct special discussion sessions to acquire more information about each package in their division. In educational institutions school principals may be requested to present and discuss their school's package to the upper level ranking groups.

During the ranking process it is important to keep personnel informed about the status of the decision packages as they progress through upper level ranking. This communication about the status of decision packages is valuable for keeping personnel interested in the zero-base budgeting process, for obtaining support for the future operation of the decision packages, and for helping staff to understand higher level ranking methods.

Eventually the ranking process leads to a listing of decision packages for the organization which is presented to authorities in administration for their decision making and allocation of resources. In educational institutions the final approval is obtained from the board of education. The board of education's funding for decision packages provides the information needed for the official budget.

Ranking levels are illustrated in Figure 20 for School District No. 12 in Adams County, Colorado. There are three levels of ranking decision in this school district.

## The Summary Ranking Form

The activity of higher level ranking groups is made easier by using a summary ranking form, which presents the packages in order of priority. The package with the highest rank is listed first, and the other packages follow in descending order according to their assigned rank. A summary ranking form displays only specific

*Flow Chart—Decision Package Rankings*

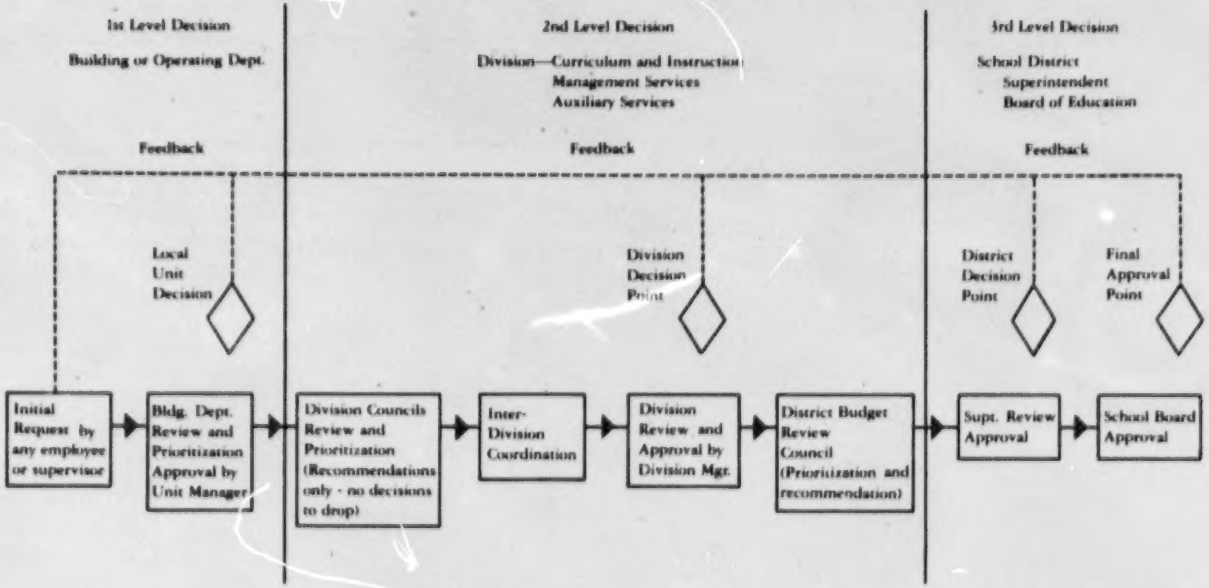



*Figure 20. Ranking Levels for School District No. 12, Adams County, Colorado*

items of information needed for analysis, which is obtained from each decision package that has been ranked.

Decision package information commonly appearing in a summary ranking form includes:

1. The rank of the decision package
2. The title of the package
3. Amount of resources required (resources are expressed as dollar totals)
4. A cumulative cost level column
5. Other items of useful information considered important by the organization, such as the funding level for previous and/or future years, number of personnel in each program, etc.

Summary ranking forms should not contain too much information because excessive data makes them difficult for the administration to use in the analysis procedure. If more information is desired, it can be found in the individual decision package documents.

The summary ranking form lists all decision packages ranked for the school district. The cumulative cost column is the source of information for the level of maximum funding for all decision packages. The level of maximum funding is established by the total amounts of funds available to the school district for the next budget period. The total of funds available to the district is usually obtained through a revenue forecast conducted by its fiscal personnel. All decision packages ranked below the level of maximum funding usually will not be funded. Should more money become available to the district, additional decision packages may be funded in order of their priority rank.

In Figure 21 an example of a summary ranking form is provided to illustrate the level of maximum funding concept. The information is fictitious, but it will help to understand the form and its use. Decision packages are listed in order of priority for the next fiscal year. The total funds available for the 1979 fiscal year are $47,480,000. Individual programs for fiscal year 1979 are expected to consume $47,544,000. A $55,000 cash balance is estimated as a carryover from the previous fiscal year.

The information contained in a summary ranking form provides decision package facts on the basis of which resource allocation decisions will be made. Some of the decision areas based on the information contained in Figure 21 include the following:

1. Fifteen fiscal year 1979 programs have increased in costs and five have decreased expenditure plans.
2. Fiscal year 1979 resources are below the amount needed to fund all of the 1979 programs.
3. Decision packages are ranked in order of priority from one through eighteen for funding.
4. The Outdoor Education program ranked 19 may be funded if some of the cash balance is used.

## *Summary Ranking Form*

| Decision Package | | Dollar | (In Thousands) Cost | Cumulative Cost |
|---|---|---|---|---|
| Rank | Title | FY 1978 | FY 1979 | |
| 1 | General Instructional Program | 35,100 | 36,000 | 36,000 |
| 2 | Vocational Education Program | 1,090 | 1,200 | 37,200 |
| 3 | Special Education Program | 3,900 | 4,700 | 41,900 |
| 4 | General Administrative Services | 1,050 | 1,120 | 43,020 |
| 5 | Summer School Program | 410 | 390 | 43,410 |
| 6 | Adult Education Program | 509 | 400 | 43,810 |
| 7 | Instructional Materials Center | 281 | 290 | 44,070 |
| 8 | Bilingual Education Program | 241 | 430 | 44,500 |
| 9 | Gifted and Talented Program | 98 | 80 | 44,580 |
| 10 | Interscholastic Athletics | 540 | 491 | 45,071 |
| 11 | Co-Curricular Activities | 59 | 60 | 45,131 |
| 12 | Driver Education Program | 320 | 275 | 45,506 |
| 13 | Counseling and Guidance Program | 410 | 484 | 45,890 |
| 14 | Research and Development Program | 87 | 90 | 45,980 |
| 15 | Publicity and Information Service | 135 | 140 | 46,120 |
| 16 | Student Transportation Service | 781 | 800 | 46,920 |
| 17 | Personnel Development Program | 23 | 28 | 46,948 |
| 18 | Health Services | 478 | 511 | 47,459[a] |
| 19 | Outdoor Education Program | 60 | 65 | 47,524 |
| 20 | Reserve Officer Training Corps | 16 | 20 | 47,544 |
| | TOTAL | 45,588 | 47,544 | |

[a]—minimum funding level for fiscal year 1979

*Figure 21. Example of a Summary Ranking Form*

5. Decision packages numbers 19 and 20 are below the final funding cut-off point and may not be funded.
6. Re-examination of some decision packages may be required.

If the ranking committee wishes to fund decision packages below the maximum funding cut-off point, they might reassess some of the individual decision packages included in the single consolidated decision packages. This reassessment may lead to a lower funding level for some of the individual decision packages. Thus the lower total consolidated decision package funding may, in turn, make it possible to fund one or more decision packages below the original maximum funding level.

This section has discussed the ranking of decision packages. School districts should develop policies, rules, procedures and forms for the ranking process. Persons engaged in the ranking process need to acquire the knowledge and skill required for ranking decision packages. The rank order depicts the value of the decision package to the organization as well as its place in order for funding. Each separate decision package competes with all others for its share of the district's resources. That the feeling and attitudes of the people who rank the decision packages may enter into the decisions during the ranking process may or may not improve the ranking decisions. Regardless of how the ranking is accomplished, the district will be provided a listing of decision packages in order of priority.

This discussion of ranking decision packages has considered the academic and mechanical process of ranking, but not the political aspects. Within all organizations, however, there exists a "political" environment that encompasses and permeates all operations and processes when people interact within the institution. Educational organizations, because of their nature and operations, are highly dependent upon people interacting with each other to attain desired goals and objectives. The people ranking decisions packages are in competition for a share of the institution's limited resources. The competition for a rank that assures funding among the people who develop and/or administer decision packages might become detrimental to the achievement of goals.

The political problem should not cause an organization undue difficulty, but it must be recognized and understood. The use of lower level and upper level committees for ranking tends to minimize the politics of ranking. It should also be noted that organizations have resolved resource allocation concerns prior to the use of zero-base budgeting.

## Zero-Base Budgeting Summary

Although zero-base budgeting is quite new to the field of education, educators are now acquiring an understanding of this management tool. The few school districts that are beginning to install a zero-base budgeting management process are performing the research and development services education needs. Numerous publications may prove helpful to administrators in educational institutions.

The two basic processes inherent in zero-base budgeting are the development of decision packages and the ranking of the decision packages. A decision package is the description of a program of activities to be conducted by the school district. The decision package is subjected to an intensive analysis which will result in its being continued or terminated. Decision packages are then ranked in order of priority value to the school district. Funding levels are determined for each program. The program costs are then used to prepare the district's budget for the next fiscal year.

Zero-base budgeting as a management tool can be integregated into a school district's management system, if desired. This management tool assists school administrators to define programs in an order of importance to the organization. Zero-base budgeting provides for greater control over where the district's resources are expended. Also, the zero-base budgeting process will provide useful information about where budget reductions least harmful to the goals of the organization can be made.

The installation of zero-base budgeting requires a visible and strong commitment by administration, knowledgeable and skilled personnel, and an adequate implementation manual which details all processes, forms, and communication linkages. The implementation of zero-base budgeting cannot be accomplished overnight. A time schedule that reflects personnel and organizational needs and resource capacity must be planned.

# Chapter 4

# Other Planning and Management Tools

Several other types of management tools are useful for planning and controlling certain standard or routine tasks conducted by educational institutions. Three of these tools will be presented in this chapter: Gantt charts, milestone charts and flow charts.

## Gantt Charts

One of the earliest forms of management tool is the Gantt chart, developed by Henry L. Gantt. Gantt used the method to chart processes for establishing a structured form for planning and controlling production operations. The Gantt chart is a process-oriented display which assists in the management of operational functions. The activities or processes are given a time dimension. Thus, Gantt charting the processes of a program through time can be useful in controlling and evaluating results. The major advantage of Gantt charting a program is that progress can be measured in accordance with the developed sequence of activities, which lead to the achievement of objectives. The Gantt chart provides good visibility for each identified program activity.

The Gantt chart is a relatively simple means for displaying processes through time schedule. Gantt charts are readily understandable and thus assist in explaining program processes to all persons concerned. Since Gantt charts are largely process-oriented, they are quite useful for planning and controlling manpower and man-machine operations.

Gantt charts have three limitations for the educational manager who wishes to use them for planning and controlling the processes of a program. The first limitation is that the interrelationship among processes is not developed and clarified. A second limitation is that performance levels of a process are not provided, thus assessments of

performance tends to be subjective in nature. A third limitation is that resources to be used in the process are not displayed on the Gantt chart.

## Steps in Developing a Gantt Chart

The procedural steps for developing a Gantt chart are relatively simple and straightforward. The basic steps are as follows:

1. Determine the overall time schedule for beginning and ending the program.
2. Identify and list all desired processes to be performed in order to achieve the program objectives.
3. Arrange the processes in sequence so they will be performed from the first to the last.
4. Divide the overall time schedule in smaller blocks of standard time units. Days, weeks, or months are commonly used.
5. Draw a line or bar through the time dimension to indicate the start and ending times for each listed process.

In the example provided in Figure 22, the zero-base budgeting presentation is used to illustrate the development of the Gantt chart.

| | Time (Days) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Process Description** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1. Establish objectives | | | | | | | | |
| 2. Select consultant | | | | | | | | |
| 3. Consultant prepares presentation | | | | | | | | |
| 4. Set date for presentation | | | | | | | | |
| 5. Arrange for space/equipment | | | | | | | | |
| 6. Review presentation | | | | | | | | |
| 7. Presentation to the board | | | | | | | | |
| Total Time 8 days | | | | | | | | |

*Figure 22. Example of a Gantt Chart for Zero-Base Budgeting Presentation*

In this Gantt chart, process 1 uses one day. Processes 2, 6, and 7 are also one day in duration. Process 3 takes three days. The fourth and fifth processes each use one-half day, while time usage for processes 3, 4, and 5 overlaps. Such an overlapping usually indicates a multiple resource commitment.

To acquire greater management control, it is sometimes desirable to list the processes of a program on a separate paper along with their resource allocations. This type of display, illustrated in Figure 23, is called a Process Resource/Cost Chart. The total resource cost represents the overall cost of the program.

| Process Description | Resource Cost Items | | | | | |
|---|---|---|---|---|---|---|
| | Staff | Travel | Equip. | Mat. | Other | Total |
| 1. Establish objectives | 400 | | | | | 400 |
| 2. Select consultant | 100 | | | | 50 | 150 |
| 3. Consultant prepares presentation | 200 | | | 100 | | 300 |
| 4. Set date for presentation | 100 | | | | | 100 |
| 5. Arrange for space/equipment | 100 | | | | | 100 |
| 6. Review presentation | 100 | | | | | 100 |
| 7. Presentation to the board | 200 | 150 | 50 | 50 | 100 | 550 |
| Total Resource Cost | 1,200 | 150 | 50 | 150 | 150 | 1,700 |

*Figure 23. Example of Process Resource/Cost Chart*

The Process Resource/Cost Chart is needed to acquire greater management control over the program when using Gantt charts.

A similar chart is also desirable for additional management control over personnel resources when using Gantt charts. This type of chart again lists the process and directly opposite each process is the name of the group or individual responsible for achieving the process (See Figure 24).

| Process Description | Person(s) Responsible |
|---|---|
| 1. Establish objective | School Executive Board |
| 2. Select Consultant | Selection Team |
| 3. Consultant prepares presentation | Consultant |
| 4. Set date for presentation | Superintendent/Board |
| 5. Arrange for space/equipment | Assistant Superintendent |
| 6. Review presentation | Superintendent |
| 7. Presentation to the board | Consultant |

*Figure 24. Example of a Process Responsibility Chart*

In general, Gantt charts are useful for process-oriented programs routine to the organization, but they have limitations for managing all aspects of a program. One serious drawback is the lack of performance measures. Also, resources must be planned and managed with additional charts. It is difficult to develop Gantt charts for large complex programs, but Gantt charts are beneficial when the program is relatively simple and of short duration. These simple types of charts are easy to develop, and they do provide management with tools to guide a program to its objective achievement.

## Milestone Charts

The milestone chart is a product-oriented display useful for planning the activities of an organization that terminate with the output of a tangible product. A milestone is defined as a specific and defined accomplishment resulting from the expenditure of the organization's resources.

The starting and ending points of activities are charted through an identified time period. Usually small triangles are used to symbolize the completion of a milestone product. The milestone chart lists activities in a single vertical column, with time displayed to the right of each activity.

Figure 25 is an example of a simple milestone chart using a descriptive research program for illustration. Milestone activities, as in PERT, can be very detailed (micro) or general (macro) in nature, depending upon the wish of the person doing the charting.

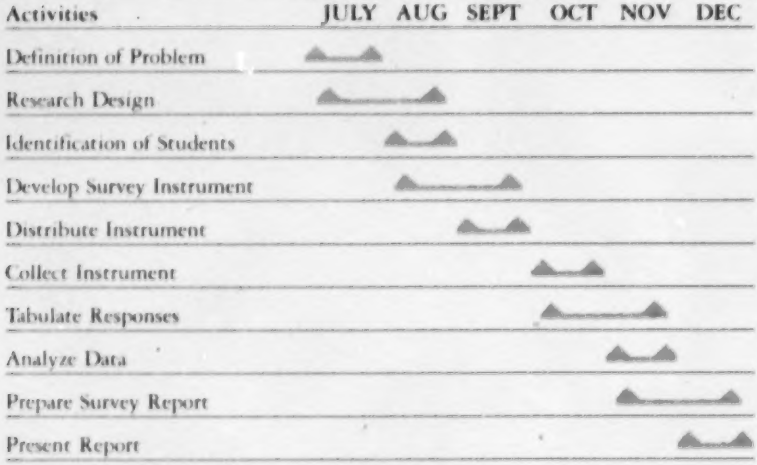



*Figure 25. Example of a Milestone Chart*

Milestone charts, like Gantt charts, usually require that additional reports and/or charts be developed to meet the needs of management more fully. Other planning and control charts which may be useful are:

1. Personnel responsibility matrices
2. Resource cost forms
3. Time/Personnel/Resource charts
4. Progress reports
5. Discrepancy reports to show how the actual results have deviated from the program as planned.

Even with the limitations inherent in milestone charts, they will improve management processes if no other planning methods exist. Managers may learn to use milestone charts and then extend themselves to other more complicated management tools, such as PERT.

The major product of this research activity was the information contained in the final report. Other subproducts were the research design, the instrument and the data analysis.

Milestone charts have many of the same characteristics and similar disadvantages to Gantt charts in displaying activities of a program or project. They do not display interdependencies and/or sequential relationships between activities. Nor do they establish personnel responsibilities unless modified to include this dimension.

Milestone charts are useful for presenting and displaying activities on a gross or macro basis. They can provide initial information about activities helpful in preparing a more detailed PERT network. Milestone charts may also be used to present the current or existing status of program activities in a progress report. The milestone chart provides a relatively easy-to-understand visual display.

## Flow Charts

A flow chart is a process-oriented network that presents an event-activity-event relationship over a prescribed time period. In some respects, the flow chart combines the procedures of the Gantt and milestone charts. PERT, Gantt charts and milestone charts do not allow for this recycling as do flow charts.

Flow charts are symbolic representations of operation sequence, information flow, control flow, and in some cases a processing logic for information processing. There are basic types of flow charts. A systems flow chart describes the sequence of major activities in a program. A second type is the computer flow chart used to describe the sequences of operations and logic for a computer program. The computer flow chart will not be discussed in this publication since the subject is management tools for school administrators.

Because flow charting has become common in information processing, flow chart symbols have been standardized. Templates for standard international and American symbols for flow charting are available in most office or computer supply stores.

Flow charting provides for several types of activity sequence arrangements:

1. *Looping*—recycling through previous or new activities.
2. *Branching*—a procedure for going around or skipping some nonessential activities in the flow chart.
3. *Switching*—a type of branching which is "yes" or "no" or "on" or "off" at various points.

Flow charting is a useful management tool for describing individualized instructional learning modules in a competency-based education program. The flow

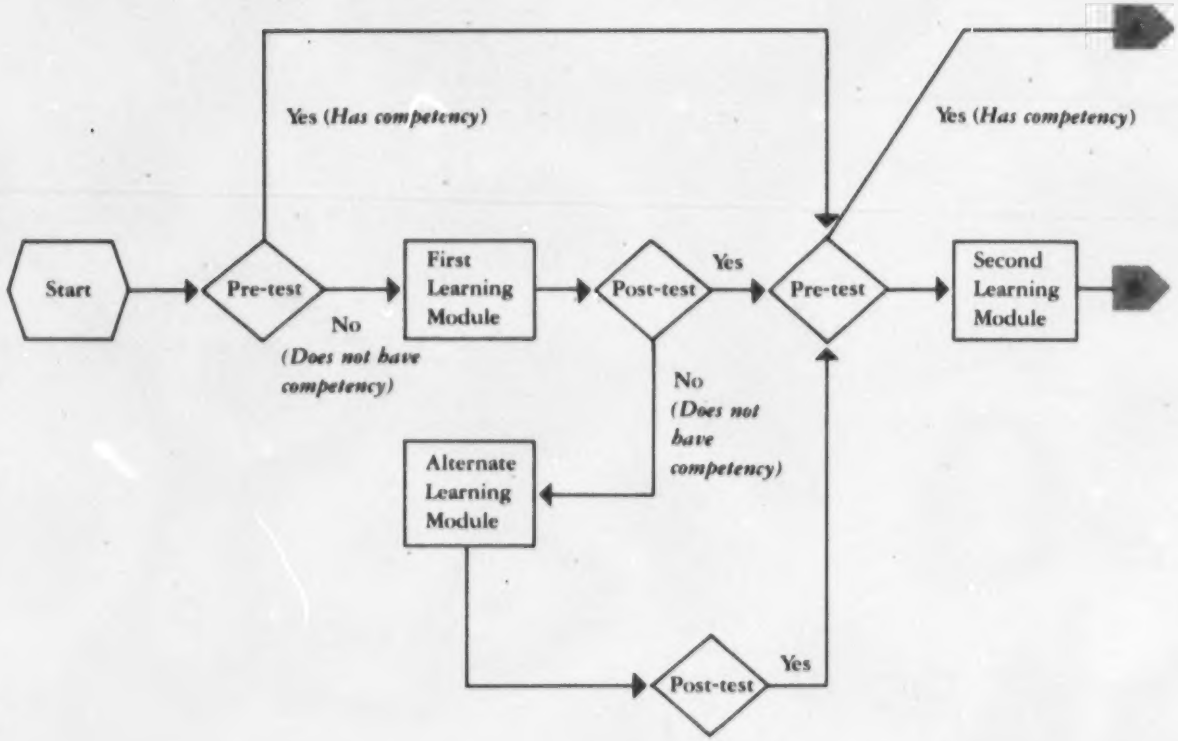



*Figure 26. Example of a Flow Chart for a Learning Model*

chart presents the potential learning paths for each student as he/she proceeds through the sequence of instructional activities. The flow chart for the basic logic "Do Until Achieved" is illustrated in Figure 26.

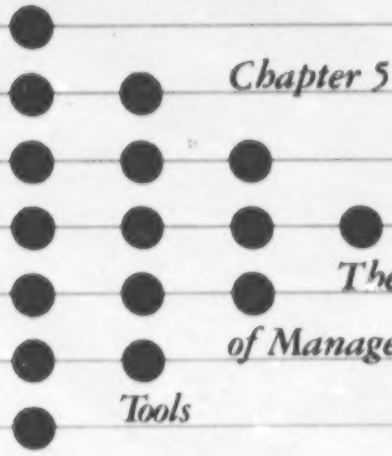
The standard is to diagram flow charts so they can be read from left to right or top to bottom. Arrowheads are frequently used to indicate flow and are necessary if the flow is in a reverse direction. Arrowheads improves the readability and clarity of a flow chart. Notations, small letters or numbers can be used to describe a particular or unusual condition associated with a symbol in a flow chart.

Because the drawing of flow charts is the result of creative activity, usually no two people will draw them in exactly the same way. However, using the symbols and techniques of the International Organizations for Standardization or the American Standards Institute will enhance the effective use of flow charting by educational managers.

## Summary of Charting

Gantt charts, milestone charts, and flow charts are specific types of management tools useful for planning and controlling educational programs. Each tool has certain advantages and some disadvantages. The successful user of these tools knows which tool is appropriate for the particular situation at hand.

These three management tools may be used to support status reports or to plan an entire project. The procedures for use are not complex and can be applied in many educational management situations.



# Chapter 5

# The Implementation of Management Tools

Progress is being made by business and government in using management tools; however, knowledgeable persons in the field agree that minimal use of these tools is currently being made by educational organizations. The lack of knowledge and expertise among educators relating to their use will restrict implementation on a large scale. A general lack of understanding regarding the process of design, development, and installation appears to be a major deterrent for management tools in educational institutions. Such inadequacies of knowledge and design, when added to the lack of publications which document the application of management tools, indicate the need for more training and development.

This closing section presents the design needs and administrative issues that people in educational organizations will be confronted with when implementing management tools.

The following three important implementation issues will be presented:

1. Creation of procedures and documents
2. Administration and communication requirements
3. Personnel development processes

Educational administration must be committed to several conditions when they desire to implement management tools in an educational environment. These conditions are:

1. Acceptance and positive leadership by the district administration
2. Direct personal involvement by the administrators in operational levels of the district.
3. Creation of implementation procedures and guidelines.
4. Controlled administration and evaluation of the tool.

## Creation of Procedures and Documents

First it should be recognized that no one specific type of implementation design will be appropriate for all educational organizations. Each institution must develop its own special procedures for implementing management tools even though general implementation guidelines exist. These questions related to these implementation guidelines need to be considered:

1. Where in the organization should the management tool be implemented? Should the installation encompass the entire organization or should it be installed in only a few divisions of the district?
2. Who will be responsible for the implementation?
3. What guidelines are needed by persons who must perform implementation activities?
4. By what methods will the management tool be communicated and administered?
5. What personnel development programs are needed?
6. What is the schedule of activities required for the implementation?
7. How will evaluation of the management tool implementation be achieved?

These seven questions must be answered before starting implementation activities. The solutions to some of the questions may require major changes in current methods of operation, but too many major changes should be avoided since they could disrupt the operations of the organization.

## Administration and Communication Requirements

***Administration***

Leadership for implementing management tools must be provided by the superintendent and other central staff personnel. This upper level administrative support is needed for the following reasons:

1. To establish implementation policies
2. To determine where in the school district to begin the implementation
3. To appoint the implementation team and define its responsibilities
4. To allocate resources for the implementation program
5. To monitor progress and replan where essential
6. To evaluate outcomes of implementation activities

The planning and organization essential for implementing most management tools can be accomplished by an implementation team consisting of persons who represent all levels of the organization where the management tool is to be installed. The size of the team will vary, depending on the wishes of administration. A small but active team can provide the assistance and guidance required since most of the work can be done by the organization's division administrators.

Team members should become thoroughly knowledgeable with all aspects of

the management tool. They can acquire this expertise through a review of management tool literature, visits to the organizations involved in its operation, and consultation with outside experts. Team members may also wish to attend any management tool training programs sponsored by other organizations.

***Communication***

Through communication the leadership of a school district gains and marshalls the support it needs to install a management tool. Whenever top level administration communicates its reasons for implementing a management tool, other persons at different levels of operation become much more willing to participate in the essential activities. The superintendent can obtain support through an early disclosure of the policy decisions regarding the implementation.

Communication of a management tool philosophy and procedures is achieved by:

1. Developing and distributing an implementation guideline.
2. Conducting staff development meetings to present and discuss the contents of the guideline.
3. Holding scheduled meetings at all levels of the organization during the implementation effort to identify and discuss progress and problems.
4. Holding short briefing sessions for individuals involved in the implementation.
5. Issuing progress and evaluation reports.

A properly developed communication program will help people to understand their role and responsibilities in the implementation of the management tool. Through communication administrators can also learn about and resolve implementation problems.

## Personnel Development Processes

The implementation of a management tool will succeed to the extent that people are able to develop the required knowledge and skills. Because the management tool is new, personnel development is essential for its effective implementation in school districts. The success or failure of a school district is completely within the control of the people working in the system. The staff development program can become the most important asset a school system has to insure the successful implementation of a management tool. Because of its great importance, staff development must be carefully planned and conducted for all appropriate members of the organization and should furnish desirable and attainable opportunities for professional growth.

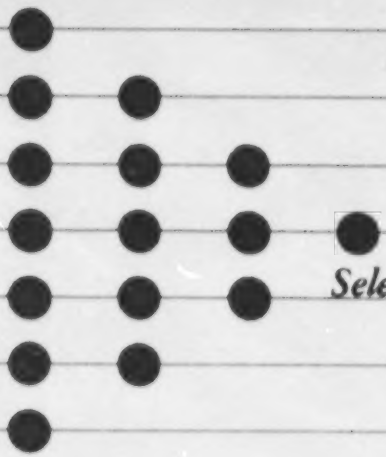
Successful personnel development programs depend upon specific planned procedures. The plans should make provision for:

1. Assessment of personnel development needs.
2. Assessment of personnel strengths and weaknesses.
3. The design of the special training program which includes: (a) the objectives, (b)

the instructional content, (c) the methods of instruction, (d) a time schedule, (e) the instructors, (f) the facility, materials and supplies, and (g) the evaluation of the program.

School systems can use a variety of ways to conduct personnel development programs, including:

1. Released time for personnel during the school day.
2. Afternoon, evening, or weekend sessions with compensation for time spent in the program.
3. Summer development programs with compensation for personnel who participate.

Administration is responsible for identifying personnel development needs, designing and conducting the development programs, and assessing the outcomes. Any modern management tool can be successfully installed in a school district if the people who install it are motivated and have the knowledge and technical skills to perform their responsibilities.

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